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A Study in Patterns

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In a repeating pattern, the same structure occurs over and over again. Nature is full of repeating patterns similar to the pattern in the kaleidoscope image below. Crystals, for example, are patterns of repeating elements.

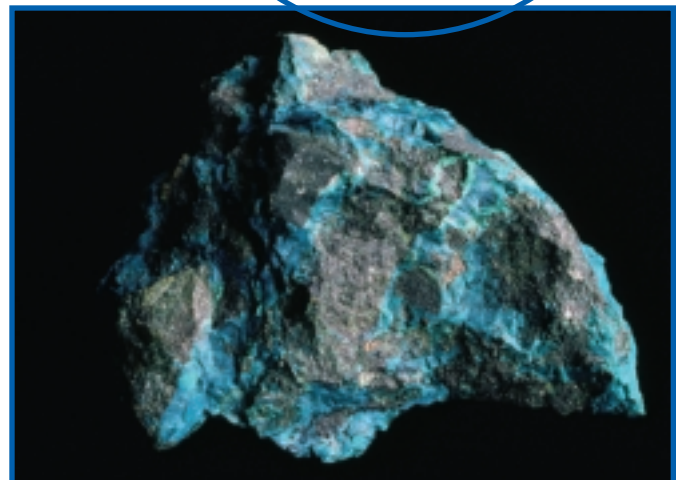


1. What basic structure is repeated and how is it grouped to form the total design?
2. How might a kaleidoscope image relate to the structure of a mineral?

About 4,000 different kinds of minerals can be found on Earth. Some minerals exist in a variety of forms. You'll need skill and knowledge to identify that interesting rock you found at the beach. What can you tell about the three mineral samples shown here?



1. What are some similarities and differences in appearance among the three samples?
2. Do you think that the photos show the same mineral or different ones? Explain.
3. What other traits might help you identify different minerals?



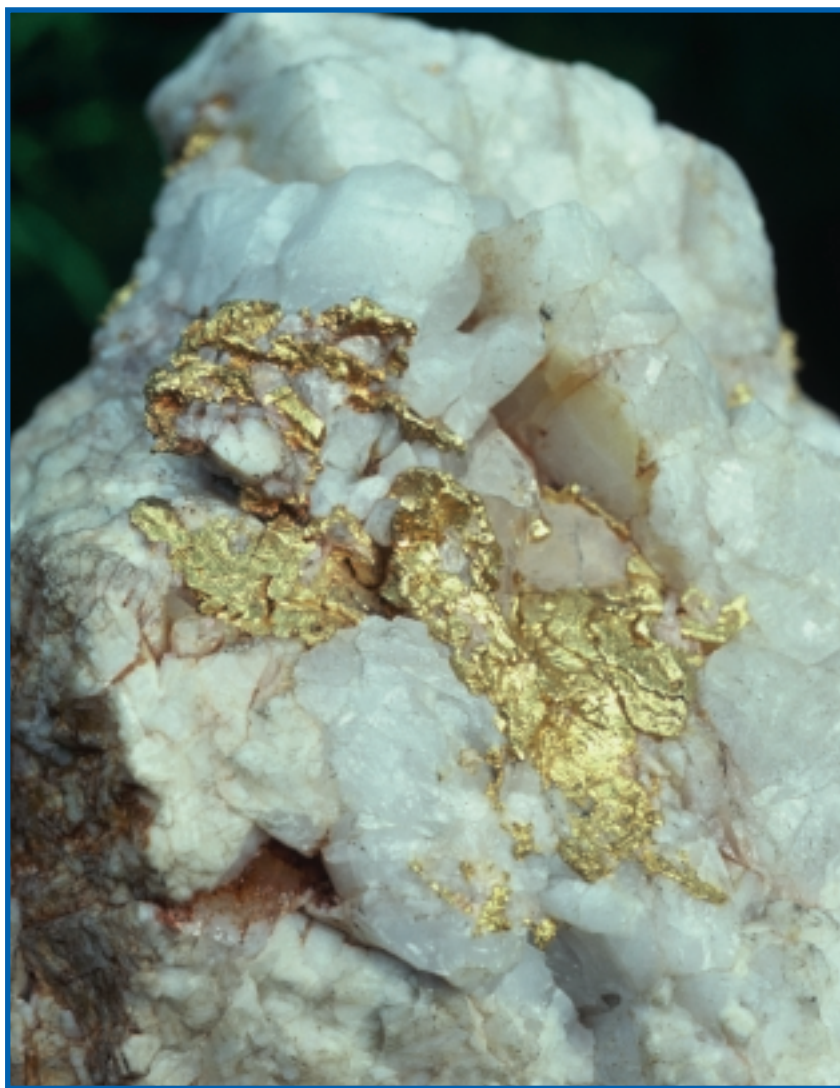
SECTION
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Section Focus
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Golden Days

ES.5
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Gold is a valuable metal that occurs in small amounts in all igneous rocks. It's unusual, however, to find rock that is very rich in gold. In that case, the rock is called gold ore. The gold ore must be hauled to the surface and refined before it looks like the metal you see in jewelry.



1. Why do you think some minerals and metals are considered valuable, while others are not?
2. Describe the gold vein pictured above. Does the gold look the same as it does in jewelry?
3. What other metals can you name that are mined like gold?

Table 1 Mineral Hardness

Mohs Scale	Hardness	Hardness of Common Objects	
Talc (softest)	1		
Gypsum	2	fingernail	(2.5)
Calcite	3	piece of copper	(2.5 to 3.0)
Fluorite	4	iron nail	(4.5)
Apatite	5	glass	(5.5)
Feldspar	6	steel file	(6.5)
Quartz	7	streak plate	(7.0)
Topaz	8		
Corundum	9		
Diamond (hardest)	10		



Directions: Carefully review the chart and answer the following questions.

Elements Found in Some Minerals							
	Al	C	Ca	Fe	Na	O	Si
Calcite		✓	✓			✓	
Feldspar	✓		✓		✓	✓	✓
Olivine			✓	✓		✓	✓
Mica	✓					✓	✓
Quartz						✓	✓

- According to the chart, which mineral contains the greatest variety of elements?
A Calcite
B Feldspar
C Olivine
D Quartz
- About 92 percent of the rock-forming minerals in Earth's crust are silicates. Silicates are compounds that contain silicon, oxygen, and one or more metals. According to this definition, which of these is not a silicate?
F Calcite
G Feldspar
H Olivine
J Mica
- According to the chart, which element is found only in calcite?
A Al
B C
C Fe
D Na
- A reasonable hypothesis based on the data is that the two most abundant elements in Earth's crust are ____.
F C and O
G Ca and Si
H Al and O
J Si and O